

REMARKS

Claims 1-65 are pending.

Referring to Paragraph No. 2 at page 2 of the Office Action, Claims 1, 3, 5, 9-12 and 58-59 were rejected under 35 U.S.C. § 102(b) as allegedly being unpatentable over the article titled “Anomalous first-phase formation in rapidly thermal annealed, thin layered Si/Ni/Si films” (hereinafter “Natan”). Referring to Paragraph No. 1 at page 4 of the Office Action, Claims 4, 8 and 11 were rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Natan in view of the article titled “In-situ Investigation of the formation of nickel silicides during interaction of single-crystalline and amorphous silicon and nickel” (hereinafter “Bokhonov”). Referring to page 5 of the Office Action, Claim 6 was rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Natan in view of the article titled “Formation of Ni silicide from Ni(Au) films on (111)Si” (hereinafter “Mangelinck”).

Applicants traverse and respectfully request the Examiner to reconsider and withdraw the rejections based on the following remarks.

The references applied by the Examiner fail to disclose or suggest the present claims, at least because the layer structure containing silicon (Si) and nickel (Ni) is formed in an amorphous state.

The Examiner takes the position that Applicants define an amorphous state as a situation wherein a nickel layer is formed on an amorphous silicon layer as provided in paragraphs [0021]-[0022] to obtain nickel monosilicide.

Applicants respectfully disagree

The definition of an amorphous state is not limited to the disclosure at paragraphs [0021]-[0022] of Applicants’ disclosure. For example, in paragraph [0081], Applicants teach a

preliminary treatment wherein “the nickel layer and the silicon layer are changed from amorphous states to more crystalline states” before the nickel silicide reaction. In other words, in the initially formed layer structure, both the Si and Ni layers are in an amorphous state.

The Examiner also takes the position that Natan allegedly discloses in its abstract that the mixture of Ni + Si was at an amorphous state prior to the forming of nickel monosilicide, and therefore, the Ni and Si layers are formed in an amorphous state.

Applicants respectfully disagree.

Natan fails to teach or suggest Ni and Si layers formed in amorphous states. For example, Natan discloses at the beginning of the last paragraph of page 257 that “[b]efore annealing, all films exhibited the Ni polycrystalline diffraction pattern.” In other words, it would have been clear to one of ordinary skill in the art in possession of the teaching of Natan that at least the Ni layer is polycrystalline, which distinguishes Natan from the present claims.

In addition, Natan discloses that trilayer Si/Ni/Si structures were deposited by *e*-beam evaporation, which is a variant of PVD. As set forth in the previous response, Applicants submit that forming Ni into a thin film with an ordinal PVD method generally provides a polycrystal. Therefore, an amorphous formation of Ni and other metals would not have been obvious to one of ordinary skill in the art at the time of the invention.

Moreover, forming the layer structure in an amorphous state facilitates better diffusion between the layers prior to the thermal treatment step of forming nickel monosilicide. (*See* Specification at the paragraph bridging pp. 5-6 and the first full paragraph on p. 21.) Therefore, the Ni atoms in the amorphous nickel layer preferentially diffuse into the amorphous Si layer rather than the crystalline Si substrate. Accordingly, the consumption or “thinning” of the silicon

substrate is minimized. These features of the presently claimed invention further support the patentability of the present claims.

In view of the above, reconsideration and withdrawal of the prior art rejections of the present claims are respectfully requested.

Reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited.

If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the local, Washington, D.C., telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,



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